

**REMARKS**

The application has been reviewed and revised in light of the Office Action mailed on May 3, 2006. Claims 1-27 and 29-57 are currently pending in the application, with Claims 1, 23, 29, 51, 53 and 57 being in independent form. By this amendment, Claims 1, 3, 19, 22-23, 29, 31, 46-47, 50-54 and 57 have been amended to clarify Applicants' invention and patentably distinguish over the prior art. No new matter or issues have been introduced by the amendments. In view of the amendments above and the remarks to follow, reconsideration and allowance of this application are respectfully requested. Accordingly, early and favorable consideration of this application is respectfully requested.

**Rejection of Claims 1-14, 16-27, 29-42 and 44-57 Under 35 U.S.C. § 103(a)**

Amended Claim 1 recites:

1. A method for exchanging a first sub-hierarchy of at least two sub-hierarchies of a hierarchical file system (HFS) with a second sub-hierarchy of the at least two sub-hierarchies, the HFS being accessible by at least one processor and having one root directory that is a parentless directory, the method comprising the steps of:

providing for the first sub-hierarchy to include a first root directory located in a first location occupied by the root directory of the HFS and a first plurality of files configured to branch therefrom;

providing for the second sub-hierarchy to include a second root directory located in a second location of the HFS that is not occupied by the root directory of the HFS and a second plurality of files configured to branch therefrom; and

providing for relocation of the second root directory from the second location to the first location which is occupied by the root directory of the HFS. (Emphasis added)

Amended Claim 23 recites:

23. A computer system comprising:
- at least one processor;
  - a hierarchical file system (HFS) accessible to the at least one processor, the HFS having at least two sub-hierarchies including first and second sub-hierarchies and one parentless root directory, wherein the first sub-hierarchy includes a first root directory located in a first location occupied by the root directory of the HFS and a plurality of files configured to branch therefrom, and the second sub-hierarchy includes a second root directory located in a second location of the HFS different from the first location and a second plurality of files configured to branch therefrom; and
  - a set of programmable instructions executable on the at least one processor for providing for exchanging the first sub-hierarchy with the second sub-hierarchy comprising:
    - receiving a request to exchange the first sub-hierarchy with the second sub-hierarchy; and
    - providing for relocating the second root directory from the second location into the first location which is occupied by the root directory of the HFS and configuring the second plurality of files to branch therefrom responsive to the receipt of the request, the providing for relocating including providing for reconfiguring at least one pointer included in the HFS. (Emphasis added)

Claims 1-14, 16-27, 29-42 and 44-57 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent Application Publication Number 2004/0133790 to Hensley (hereinafter "Hensley") in view of U.S. Patent Application Publication Number 2003/0065789 to Maurer III et al. (herein "Maurer III"). Claims 1, 23, 29, 51, 53 and 57 have been amended to

clarify Applicants' invention. No new issues have been raised. The amendments merely emphasize what has already been stated. It is well known that a HFS only has one parentless root directory, therefore amending the claims to recite "one parentless root directory" does not raise new issues. Since it was stated that the first root directory is located in a first location occupied by the root directory, amending the claims to recite "relocation of the second root directory from the second location to the first location which is occupied by the root directory of the HFS" does not raise any new issues. Claim 23 has been amended to recite subject matter similar to Claim 57, which does not raise any new issues.

Hensley describes an emergency boot directory containing a backup copy of a primary operating system, which is maintained in a protected, hidden subdirectory hierarchy during normal computer operations. A bootable media, which may be a removable media, contains bootstrap code operative to load and run the backup operating system if the primary operating system fails to boot and run (see Abstract). The emergency boot directory may be located within the same partition as the primary operating system files (see [0022], lines 6-9). The emergency boot directory is formed by making a copy of the primary operating system and configuration files by duplicating each of the original operating system files from the computer hard drive into the new emergency boot directory hierarchy (see [0022], lines 1-4). Next, the operating system configuration files that were copied to the new emergency boot directory hierarchy are modified to replace any references to the original operating system directory structure with references to the new emergency boot directory hierarchy (see [0023]).

A bootable removable media, such as a floppy diskette containing copies of the original operating system bootstrap files, such as BOOT.INI, NTLOADER AND NTDETECT.COM, or a CD-ROM or DVD disk conforming to the "El Torito" format, is created (see [0024], lines 1-7).

The bootstrap configuration file BOOT.INI copied to the bootable removable media is modified to replace any references to the primary operating system directory structure with references to the new emergency boot directory. This file may be modified after it is copied or prior to being placed on the bootable removable media (see [0025]). A filter driver is provided and copied to the primary operating system subdirectory hierarchy. The computer is rebooted using the primary operating system files so that the files system filter driver is loaded and operative to hide the emergency boot directory structure (see [0026]).

Once the emergency boot directory, filter driver and bootable removable media are prepared, a backup operation may be performed. The backup operating system files can be used to boot the computer if the existing bootstrap code within the master boot record or partition boot record becomes unusable, such as due to corruption (see [0030], lines 1-5). When a user decides to boot the computer using the backup operating system the user uses the bootable removable media to boot the computer so that the emergency boot directory will be used.

Hensley does not disclose or suggest, "providing for relocation of the second root directory from the second location to the first location which is occupied by the root directory of the HFS", as recited in Applicants' Claim 1. Applicants' Claims 23, 29, 51, 53 and 57 include similar recitations.

Henley describes providing the back-up system, including the copy or back-up of the primary operating system and the copy of the bootable removable media, which includes modifying the copied primary operating system and copied bootstrap configuration file by replacing references to the primary operating system with references to the new emergency boot directory. Booting the computer to use the copy of the primary operating system, such as when the original operating system has become un-bootable or unstable, includes using the copy of the

bootable removable media for booting. When a user wishes to use the back-up copy, the user uses the copied bootable removable media for booting. During the booting there is no modifying of pointers or pointers included in the HFS. Hensley does not disclose or suggest, "receiving a request for providing for relocation of the second root directory to the first location" and "providing for relocating ... responsive to the request...the providing for relocating including providing for reconfiguring at least one pointer included in the HFS", as recited by Applicants' Claim 23. Applicants' independent Claim 57 and dependent Claims 13 and 14 include similar recitations.

Maurer III describes "a data storage system includes a storage array having logical volumes or units that can be accessed by one or more clients via a switch" [See 0112]. A first logical unit (LUN) 1204a, which can be provided as a new disk, can be restored from a second logical unit 1204b [See 0117]. A physical disk is formatted into a "physical volume". Each physical volume is split up into discrete chunks, called physical partitions or physical extents. Physical volumes are combined into a "volume group". A volume group is thus a collection of disks, treated as one large storage area. A "logical volume" consists of some number of physical partitions/extents, allocated from a single volume group (See 0053). The data storage system described in paragraph [0012] includes an array of logical volumes each consisting of some number of physical partitions/extents. Maurer III does not disclose or suggest that the logical units LUN 1204a ...1204n as being included in one HFS having one parentless root directory.

A LUN can contain data in one of the following formats: JBOD (just a bunch of disks), RAID 0 or RAID1 or RAID 0+1. Unless otherwise specified, RAID1 is assumed (See [0121]. RAID 0 (Redundant Array of Independent Disks, level 0) refers to a storageset, which is known as a stripeset, that includes striped data across an array of disks. A single logical disk can span a

number of physical disks. RAID 1 refers to a storageset which is known as a mirrorset, of at least two physical disks that provide an independent copy of the virtual disk. RAID 0+1 refers to a storageset that stripes data across an array of disks and mirrors the data to a BCV (See [0122]). Maurer III describes swapping and restoring of logical units. In one embodiment described, upon failure of LUN 1204a, the storage array provides access to a second LUN 1204b, which is a copy of LUN 1204a (See FIG. 16). With this arrangement, a disk-based “instant restore” by LUN swapping can be provided (See FIG. 17 and [0116]).

Maurer III does not disclose or suggest “exchanging a first sub-hierarchy of at least two sub-hierarchies of a hierarchical file system (HFS) with a second sub-hierarchy of the at least two sub-hierarchies”, “the HFS... having one root directory that is a parentless directory”, “providing for the first sub-hierarchy to include a first root directory located in a first location occupied by the root directory of the HFS” and “providing for the second sub-hierarchy to include a second root directory located in a second location of the HFS that is not occupied by the root directory of the HFS”, as recited in Applicants’ Claim 1. Particularly, Maurer III does not disclose or suggest that LUN 1204a includes a first root directory located in the location occupied by the root directory of the HFS. In fact, Maurer III only addresses a root when describing the “root of the tree” of a tree structure created and used to verify the accuracy of a map file, where the root stores volume group information.

Accordingly, Maurer III alone or combined with Hensley does not describe or suggest “providing for relocation of the second root directory from the second location to the first location which is occupied by the root directory of the HFS”, as recited in Applicants’ Claim 1. Applicants’ Claims 23, 29, 51, 53 and 57 include similar recitations. Accordingly, Maurer III does not cure the deficiencies of Hensley.

Applicants' dependent Claim 17 recites "wherein the providing for the exchange step is performed without copying content of the first and second plurality of files". The providing for exchange step is performed after the steps of providing for the first and second sub-hierarchies. The Examiner states that Maurer III teaches "a method for a data storage system having a data restore by swapping logical units, wherein a second root directory is relocated (restored to) to the first location" (emphasis added), which is illustrated in FIGS. 13-17.

FIG. 13 shows the storage array and a client 1206 accessing the storage array. FIG. 14 shows a copy of the first logical unit 1204a created on logical unit 1204b, with mirror synchronization established. FIG. 15 shows a split of the mirror so that writes to the first logical unit 1204a are no longer made to the copy on the second logical unit 1204b. A swap and restore procedure is shown in FIGS. 16 and 17, in which the client 1206 accesses the copy on the second logical unit 1204b, and the copy on the second logical unit 1204b is copied back into 1204a to provide "restored LUN1" (FIG. 16). FIG. 17 shows the restored LUN1 in 1204a accessed by the client 1206 (See [0115-0118]).

The process of restoring is described in U.S. Patent No. 6,101,497, which is incorporated by reference by Maurer III, "whereupon the copy program begins the transfer of data from the BCV device 226 to the MI and M2 mirror devices 224 and 225" (See column 23, lines 32-34 of U.S. Patent No. 6,101,497). Accordingly, the restoring process performed by Maurer III includes copying. Maurer III alone or combined with Hensley does not suggest or disclose "wherein the providing for exchange step is performed without copying content of the first and second plurality of files", as recited in Applicants' Claim 17. Applicants' Claim 45 includes a similar recitation.

Based at least on the above reasons, Applicants' independent amended Claims 1, 23, 29, 51, 53 and 57 do not lack novelty and are patentably distinct over Hensley and Maurer III, each alone or in any combination. Accordingly, withdrawal of the rejection with respect to amended Claims 1, 23, 29, 51, 53 and 57 and allowance thereof are earnestly solicited.

Claims 2-14, 16-22, 55-56; 24-27; 30-42, 44-50; 52; and 54 depend directly or indirectly from independent Claims 1, 23, 29, 51 and 53, respectively, and are therefore patentable for at least the reasons given above for independent Claims 1, 23, 29, 51 and 53.

**Rejection under 35 U.S.C. § 103(a)**

Claims 15 and 43 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Hensley in view of Maurer III and further in view of U.S. Patent Application Publication Number 2002/0095548 to Mansur et al. (herein "Mansur et al."). Claims 15 and 43 depend from Claims 1 and 29, respectively, and are therefore patentable for at least the reasons given above for independent Claims 1 and 29.


Mansur et al. describes a system and method for storage system controller configuration wherein a backup directory, containing more directories inside is used. Mansur et al. does not cure the deficiencies of Hensley or Maurer III. For at least the reasons described above, Applicants' Claims 15 and 43 are also believed to be allowable over the cited references, taken alone or in any proper combination. Therefore, reconsideration and withdrawal of the rejection is respectfully requested and allowance of these dependent claims is earnestly solicited.

**Conclusion**

In view of the foregoing amendments and remarks, it is respectfully submitted that none of the references of record, considered individually or in combination, in whole or in part, disclose or suggest the present invention as claimed. Therefore, all claims now pending in this

application, namely Claims 1-27 and 29-57, are now in condition for allowance. Accordingly, early and favorable consideration of this application is respectfully requested. Should the Examiner believe that a telephone or personal interview may facilitate resolution of any remaining matters, he is respectfully requested to contact Applicants' undersigned agent at the telephone number indicated below.

Respectfully Submitted,

  
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